

**Special Publication No. XX-XX**

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**Catalog of Waters Important for Spawning, Rearing,  
or Migration of Anadromous Fishes – Arctic Region,  
Effective Month X, 2013**

by

**J. Johnson**

and

**Michael Daigneault**

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Month 2013

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Alaska Department of Fish and Game

Divisions of Sport Fish and Habitat



## Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in the following reports by the Divisions of Sport Fish and of Commercial Fisheries: Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications. All others, including deviations from definitions listed below, are noted in the text at first mention, as well as in the titles or footnotes of tables, and in figure or figure captions.

Weights and measures (metric)		General		Measures (fisheries)	
centimeter	cm	Alaska Administrative Code		fork length	FL
deciliter	dL		AAC	mideye to fork	MEF
gram	g	all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.	mideye to tail fork	METF
hectare	ha			standard length	SL
kilogram	kg			total length	TL
kilometer	km	all commonly accepted			
liter	L	professional titles	e.g., Dr., Ph.D., R.N., etc.	<b>Mathematics, statistics</b>	
meter	m			<i>all standard mathematical signs, symbols and abbreviations</i>	
milliliter	mL	at	@		
millimeter	mm	compass directions:			
		east	E	alternate hypothesis	H <sub>A</sub>
<b>Weights and measures (English)</b>		north	N	base of natural logarithm	<i>e</i>
cubic feet per second	ft <sup>3</sup> /s	south	S	catch per unit effort	CPUE
foot	ft	west	W	coefficient of variation	CV
gallon	gal	copyright	©	common test statistics	(F, t, $\chi^2$ , etc.)
inch	in	corporate suffixes:		confidence interval	CI
mile	mi	Company	Co.	correlation coefficient (multiple)	R
nautical mile	nmi	Corporation	Corp.		
ounce	oz	Incorporated	Inc.	correlation coefficient (simple)	r
pound	lb	Limited	Ltd.	covariance	cov
quart	qt	District of Columbia	D.C.	degree (angular )	°
yard	yd	et alii (and others)	et al.	degrees of freedom	df
		et cetera (and so forth)	etc.	expected value	<i>E</i>
<b>Time and temperature</b>		exempli gratia		greater than	>
day	d	(for example)	e.g.	greater than or equal to	≥
degrees Celsius	°C	Federal Information Code	FIC	harvest per unit effort	HPUE
degrees Fahrenheit	°F	id est (that is)	i.e.	less than	<
degrees kelvin	K	latitude or longitude	lat. or long.	less than or equal to	≤
hour	h	monetary symbols		logarithm (natural)	ln
minute	min	(U.S.)	\$, ¢	logarithm (base 10)	log
second	s	months (tables and figures): first three letters	Jan,...,Dec	logarithm (specify base)	log <sub>2</sub> , etc.
<b>Physics and chemistry</b>				minute (angular)	'
all atomic symbols				not significant	NS
alternating current	AC	registered trademark	®	null hypothesis	H <sub>0</sub>
ampere	A	trademark	™	percent	%
calorie	cal	United States		probability	P
direct current	DC	(adjective)	U.S.	probability of a type I error (rejection of the null hypothesis when true)	$\alpha$
hertz	Hz	United States of America (noun)	USA	probability of a type II error (acceptance of the null hypothesis when false)	$\beta$
horsepower	hp			second (angular)	"
hydrogen ion activity (negative log of)	pH	U.S.C.	United States Code	standard deviation	SD
parts per million	ppm	U.S. state	use two-letter abbreviations	standard error	SE
parts per thousand	ppt, ‰		(e.g., AK, WA)	variance	
volts	V			population	Var
watts	W			sample	var

***SPECIAL PUBLICATION NO. XX-XX***

**CATALOG OF WATERS IMPORTANT FOR SPAWNING, REARING, OR  
MIGRATION OF ANADROMOUS FISHES – ARCTIC REGION,  
EFFECTIVE MONTH X, 2013**

by

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ADF&G, Division of Sport Fish, Research and Technical Services, 333 Raspberry Road, Anchorage AK 99518 (907)267-2375.

**For information concerning the Anadromous Waters Catalog and Atlas, please contact:**

J Johnson, ADF&G Division of Sport Fish Habitat Biologist at (907)267-2337.

# TABLE OF CONTENTS

	Page
LIST OF TABLES.....	ii
LIST OF FIGURES .....	ii
INTRODUCTION .....	1
Purpose and Availability of the Atlas and Catalog .....	1
STATUTES AND REGULATIONS.....	1
Statutes .....	1
Regulations .....	2
Penalties.....	2
Other Fish Habitat Protection Statutes.....	3
PERMIT APPLICATION PROCEDURES.....	4
Permits for Specified Streams .....	4
Permits for Unspecified Streams .....	5
Other Permittee Responsibilities .....	5
Contacts .....	6
ATLAS AND CATALOG USERS' GUIDE .....	8
Format .....	8
Limitations.....	8
Interpretation of the Atlas .....	10
Numbering of Specified Water Bodies .....	10
Symbols .....	13
Interpretation of the Catalog .....	14
Water Bodies by Number .....	14
Annotation Codes .....	15
Water Bodies by Name .....	16
Sources .....	16
Update Procedures.....	16
ACKNOWLEDGMENTS .....	17
DEFINITIONS .....	18
STREAM LISTING BY NUMBER .....	21
STREAM LISTING BY NAME .....	22

## LIST OF TABLES

<b>Table</b>	<b>Page</b>
Table 1.—Division of Habitat area offices and contacts. ....	7
Table 2.—List of Annotation Codes.....	15

## LIST OF FIGURES

<b>Figure</b>	<b>Page</b>
1. Atlas and Catalog Regional Boundaries.....	9
2. 1:250,000-scale quad names and numbers .....	11
3. Examples of Atlas stream numbering.....	12

# INTRODUCTION

## PURPOSE AND AVAILABILITY OF THE ATLAS AND CATALOG

Alaska Statute 16.05.871(a) requires the Alaska Department of Fish and Game (ADF&G) to specify the various rivers, lakes, and streams, or parts of them, that are important for spawning, rearing, or migration of anadromous fishes. Adopted by reference under 5 AAC 95.011 of the Alaska Administrative Code, the *Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes* (referred to as the "Catalog") and the *Atlas to the Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes* (referred to as the "Atlas") are used to make this specification. The Catalog is a numerically-ordered list of the water bodies with documented use by anadromous fish for these purposes. The Atlas shows cartographically the location, name and number of these specified water bodies, the anadromous fish species using these water bodies, and the fish life history phases for which the water bodies are used (to the extent known).

Protection of these specified water bodies is addressed by other sections of AS 16.05.871, which requires persons or governmental agencies to submit plans and specifications to ADF&G and receive written approval in the form of a Fish Habitat Permit prior to beginning the proposed use, construction or activity that would take place in specified water bodies. More detailed information about AS 16.05.871, the types of activities requiring permits, and the permit application procedures are found on subsequent pages of this document.

Copies of the *Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes* for a specified region may be obtained by writing to the ADF&G Division of Sport Fish at 333 Raspberry Road, Anchorage, AK 99518-1599 (phone 907-267-2289).

Copies of the entire *Atlas of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes* are available for examination at the ADF&G, Division of Sport Fish or Habitat offices in Anchorage, Fairbanks, and Douglas. Copies are also available for viewing at the Alaska State Library in Juneau and the Alaska Resources Library and Information Services (ARLIS) in Anchorage. Copies of regional volumes of the Atlas for the region of the state in which they are located are available for inspection at ADF&G offices in Bethel, Cordova, Craig, Delta Junction, Dillingham, Dutch Harbor, Haines, Homer, Ketchikan, King Salmon, Kodiak, Nome, Palmer, Petersburg, Sand Point, Sitka, Soldotna, Tok, Wrangell, and Yakutat.

## STATUTES AND REGULATIONS

The Alaska laws summarized below form the basis for the ADF&G's permitting program and role in regulating activities in specified anadromous fish-bearing water bodies. Implementation of these laws is the purpose for which the Atlas and Catalog are developed and maintained. These statutes and regulations are subject to amendment or repeal and should be regularly reviewed for possible changes.

### STATUTES

**AS 16.05.871** requires ADF&G to "specify" or list, "the various rivers, lakes, and streams or parts of them that are important for the spawning, rearing, or migration of anadromous fish." It also requires anyone wanting to construct a hydraulic project, or use, divert, obstruct, pollute, or change the natural flow or bed of a specified water body, or operate a vehicle in these specified water

bodies to contact ADF&G for written approval before beginning the construction, activity, or use. The department may require additional information in order to fully evaluate potential impacts to fish and game resources. Required information includes full plans and specifications for the proposed construction, activity, or use and a list of measures for protecting fish and game resources affected by the proposed activity.

If the commissioner (or commissioner's authorized representative) determines that the plans and specifications provide for the proper protection of fish and game, ADF&G Division of Habitat will issue written approval, in the form of a "Fish Habitat Permit," authorizing the proposed use or activity. In the case of a denial, the applicant may seek a hearing under AS 44.62.370.

**AS 16.05.881** establishes that any person or organization beginning a construction or use without the commissioner's written approval is guilty of a misdemeanor. The statute also dictates that any cost associated with restoring the stream to its original condition is to be borne by the guilty party and is in addition to any penalty imposed by the court.

**AS 16.05.891** authorizes ADF&G employees to issue oral approvals to a riparian landowner for removing obstructions or repairing existing structures without reviewing prepared operating plans in the event of an emergency arising from weather or stream flow conditions.

**AS 16.05.896** establishes the penalty for causing material damage to spawning beds or preventing or interfering with migration of anadromous fish as a misdemeanor. Causing material damage or interfering with migration can be a direct result of a project or use or can occur through negligence or non-compliance with the approved plans and specifications.

**AS 16.05.901** specifies that anyone violating **AS 16.05.871 – .896** is guilty of a Class A misdemeanor. It further dictates that any proceeds from fines are to be deposited in the general fund of the State of Alaska.

## **REGULATIONS**

**5 AAC 95.011:** *The Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes*, and its companion Atlas are the means by which ADF&G specifies water bodies considered important for use by anadromous fish in accordance with **AS 16.05.871**. The Atlas and Catalog are adopted by reference under **5 AAC 95.011** (a) of the Alaska Administrative Code. Permit application procedures, definitions, and other information contained in the introductions of the Atlas and Catalog are also adopted by reference under **5 AAC 95.011** (b).

## **PENALTIES**

**AS 12.55.035** specifies the fines for various offenses. Possible fines for a Class A misdemeanor resulting from a conviction for violating **AS 16.05.871 – .896** include:

- ⇒ If a defendant is not an organization: A fine of up to \$10,000.
- ⇒ If the defendant is an organization: Maximum fines of up to \$500,000; or three times the pecuniary gain realized by the defendant; or three times the pecuniary damage or loss caused by the defendant to another, or to the property of another, as a result of the offense.

In addition to these fines, convicted defendants are liable for the cost of restoring the stream to its original condition (**AS 16.05.881**), may receive up to one year in prison, and may be subject to civil fines or penalties. Please refer to the complete current text of **AS 16.05.871 - .901**, **AS 12.55.035** and **12.55.135** and **5 AAC 95.011** for detailed information.



## **OTHER FISH HABITAT PROTECTION STATUTES**

**AS 16.05.841** requires construction and maintenance of a fishway and a device for efficient passage of downstream migrants for any dam or other obstruction built across a stream frequented by salmon or other fish, the submission of plans and specifications for review and approval by ADF&G and that the structure be kept open, unobstructed, and supplied with enough water to maintain the free and efficient passage of fish through it.

If a fishway is determined by the commissioner to be impractical, **AS 16.05.851** allows for the owner/applicant to compensate for the loss resulting from the dam or obstruction by paying a lump sum acceptable to the commissioner to the fish and game fund; convey a site and construct a new hatchery and all related facilities; or fund the expansion, maintenance, and operation of an existing hatchery.

**AS 16.05.861** sets penalties or fines for violating **AS 16.05.841** and **16.05.851** and any regulations adopted under them. Owners of dams or obstructions who fail to comply with **AS 16.05.841** or **16.05.851** within a reasonable time designated in a notice from the commissioner are guilty of a misdemeanor and subject to a fine of up to \$1,000. The statute further notes that each day the owner fails to comply is a separate offense and that the dam or obstruction is a public nuisance and subject to abatement.

# PERMIT APPLICATION PROCEDURES

## PERMITS FOR SPECIFIED STREAMS

As outlined in preceding pages, a Fish Habitat Permit is required *before* any action is taken "to construct a hydraulic project, or use, divert, obstruct, pollute, or change the natural flow or bed of a specified river, lake, or stream . . ." or " . . . to use wheeled, tracked, or excavating equipment or log-dragging equipment in the bed of a specified river, lake, or stream . . ." [quoted portions from AS 16.05.871(b)]. This requirement includes, but is not limited to, construction, maintenance, repairs, or placement of structures, docks, bulkheads, road crossings (culverts, bridges, fords), stream diversions and bank stabilization projects; gravel removal; dumping any material into (or onto ice over) a water body; placer mining; water withdrawals or appropriations; the use of vehicles or equipment in the water body; and the use of explosives in or near the water body. Recreational boating and fishing activities do not require a Fish Habitat Permit.

To apply for a Fish Habitat Permit, the applicant must submit a completed application package to the appropriate ADF&G, Division of Habitat office (see Contacts section below) at least 30 days prior to the proposed start date. Technical assistance is available in many instances. By consulting with ADF&G early in the planning process, strategies for protecting fish resources can be included in submitted plans, thereby reducing permit review time and the need for project changes. The package may include a written, signed request, a completed Fish Habitat Permit Application, and any other necessary materials, including any relevant "other-agency" permit authorizations such as a U.S. Army Corps of Engineers permit application or an Alaska Coastal Project Questionnaire (see "Other Permittee Responsibilities" section below).

Information submitted with the application should be sufficiently detailed to fully describe the proposed activity and its possible effects on the specified water body and its fish resources. The following types of information should accompany the application where applicable:

- name and location of the water body;
- type of project (e.g., bridge, culvert, utility line placement, erosion control, water withdrawal, gravel removal, placer mining, etc.);
- project plans and description including drawings, description of methods, and list of equipment (i.e. design blueprints or plan view drawings, survey data, description of water body at project site, description of planned work, erosion/sedimentation control methods, etc.);
- description of in-water use of wheeled or tracked vehicle (i.e. type and size of vehicle, surface bearing pressure, dates and frequency of use, etc.);
- description of proposed or anticipated stream diversions, channelization, or bank alterations including sequence of proposed work and any dewatering actions;
- description of any material removal from or material deposition into the water body including type and amount of material;
- description of proposed blasting or use of explosives including charge size, distance to water body and impact pressures;
- dates of the proposed work or use;
- other contractors or parties involved in the project; and
- proposed mitigation measures.

Division of Habitat personnel will review the application materials and, where appropriate, issue permit approval for plans and procedures that have minimal or no harmful effects, including cumulative effects, on anadromous fish or their habitats.

If the commissioner determines that the proposed use or activity may have an adverse impact on fish or fish habitat, applicants may be required to employ appropriate measures to mitigate the adverse impacts in order to obtain a permit. For example, the department may require the applicant to utilize methods of operation or construction sequencing of a project that minimize the effects on fish migration, spawning, or rearing, or restrict work in the impacted area to certain “seasonal windows” when fish are less likely to be adversely impacted. Compensatory mitigation shall be considered only if all other mitigation measures do not adequately mitigate such adverse impacts. In those instances where the adverse impact to fish or fish habitat is unavoidable, the department, in its discretion, may withhold permit authorization.

The mitigation measures may include one or more of the actions listed below:

1. Avoid the impact altogether by not taking a certain action or parts of an action.
2. Minimize the impact by limiting the degree or magnitude of the action and its implementation.
3. Rectify the impact by repairing, rehabilitating, or restoring the impacted environment.
4. Reduce or eliminate the impact over time by preservation and maintenance operations during the life of the proposed use or activity.
5. Compensate for the impact by replacing or providing substitute resources or environments.

## **PERMITS FOR UNSPECIFIED STREAMS**

In addition, a Fish Habitat Permit may be required under AS 16.05.841 for activities occurring in a water body or portions of a water body that are not specified in the Atlas and Catalog, but are frequented by anadromous or resident fish species. Specifically, a Fish Habitat Permit is required before a dam or other obstruction is built across a stream used by fish. Procedures for obtaining a Fish Habitat Permit under, AS 16.05.841 are the same as those outlined above for AS 16.05.871. The ADF&G recommends contacting the appropriate Division of Habitat office if there is any question about whether the project requires a Fish Habitat Permit.

## **OTHER PERMITTEE RESPONSIBILITIES**

A copy of the Fish Habitat Permit, including any permit amendments, must be retained on site during the permitted activity. The permittee is responsible for the actions of contractors, agents, or other persons who perform work to accomplish the approved project. For any activity that significantly deviates from the approved plan, the permittee shall notify the Division of Habitat and obtain written approval in the form of a permit amendment before beginning the activity. Any action that increases the project's overall scope or that negates, alters, or minimizes the intent or effectiveness of any stipulation contained in a permit will be deemed a significant deviation from the approved plan. The final determination as to the significance of any deviation and the need for a permit amendment is the responsibility of the Division of Habitat. Therefore, it is recommended the permittee consult the Division of Habitat immediately when a deviation from the approved plan is being considered.

For the purpose of inspecting or monitoring compliance with any condition of a permit, the permittee shall give an authorized representative of the state free and unobstructed access, at safe and reasonable times, to the permit site. The permittee shall furnish whatever assistance and information as the authorized representative reasonably requires for monitoring and inspection purposes.

In addition to the penalties provided by law, a permit may be terminated or revoked for failure to comply with its provisions or failure to comply with applicable statutes and regulations. The department reserves the right to require mitigation measures to correct disruption to fish and game created by the project and which was a direct result of the failure to comply with a permit or any applicable law.

The permittee shall indemnify, save harmless, and defend the department, its agents, and its employees from any and all claims, actions, or liabilities for injuries or damages sustained by any person or property arising directly or indirectly from permitted activities or the permittee performance under this permit. However, this provision has no effect if, and only if, the sole proximate cause of the injury is the department's negligence.

Depending on the types of activities or work proposed to occur in a particular water body, additional permits or authorizations may be needed from other state or federal agencies, local governments, or applicable land managers. The applicant is responsible for ensuring that all necessary permits are obtained prior to starting work. Other entities that may require a permit include but are not limited to the U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, Alaska Department of Environmental Conservation, Alaska Department of Natural Resources, and private land owners.

## **CONTACTS**

Completed permit applications and requests for information or blank permit applications should be submitted to the appropriate Division of Habitat office for the area in which the project is located, as noted in Table 1 on the following page.

Table 1.–Division of Habitat area offices and contacts.

Division of Habitat Area Offices	Area of Responsibility
<p><b>Douglas Regional (I) Office</b>  802 3<sup>rd</sup> Street, Room 209  Douglas, AK 99824  465-4105 phone  465-4759 fax  Jackie Timothy, Regional Supervisor  jackie.timothy@alaska.gov</p>	<p>Middle &amp; Northern Southeast - Petersburg, Wrangell, Kake, Angoon, Juneau, Douglas, Gustavus, Haines, Skagway, Hoonah, Sitka, Yakutat, Icy Bay</p> <p>Game Management Units (GMUs; designations are approximate) 1A (northern portion) 1B, 1C &amp; 1D; 3; 4; 5; 6A (east of Cape Suckling)</p>
<p><b>Anchorage Regional (II) Office</b>  333 Raspberry Rd., Suite 2068  Anchorage, AK 99518  267-2172 phone  267-2499 fax  Michael Daigneault, Regional Supervisor  michael.daigneault@alaska.gov</p>	<p>Municipality of Anchorage, Prince William Sound, Copper River Delta, Alaska Peninsula, Aleutian Islands, Southwest and Western Alaska, Yukon and Kuskokwim Delta, - Anchorage, Whittier, Valdez, Cordova, Kodiak, Dillingham, Bethel, Togiak, Unalaska</p> <p>GMUs: 6 (west of Cape Suckling); 8; 9; 10; 11 (south of Haley Cr.); 13D (south of Haley Cr.); 14C; 16B (south half); 17; 18; 19A &amp; 19B (west portions)</p>
<p><b>Fairbanks Regional Office (III)</b>  1300 College Road  Fairbanks, AK 99701-1551  459-7289 phone  459-7303 fax  William Morris, Regional Supervisor  william.morris@alaska.gov</p>	<p>Interior and Northern Alaska; North Slope, Yukon River Basin upstream of Paimiut and Kuskokwim River Basin upstream of the Holitna River,, Copper River basin north of the Chugach Mountains - Fairbanks, Delta Junction, Glennallen, Chitna, Nome, Kotzebue, Barrow</p> <p>GMUs: 11 (north of Haley Cr.); 12; east portions of 13A, 13B, &amp; 13D; 13C; 13E (Cantwell and upper Nenana River only); east portions of 19A &amp; 19B; 19C &amp; 19D; 20; 21; 22; 23; 24; 25; 26</p>
<p><b>Mat-Su Area (IV) Office</b>  1800 Glenn Highway, Suite 12  Palmer, AK 99645-6736  745-7363 phone  745-7369 fax  Mike Bethe, Area Office Manager  mike.bethe@alaska.gov</p>	<p>Matanuska/Susitna Basin, Talkeetna Mountains - Palmer, Wasilla, Big Lake, Talkeetna, Trapper Creek</p> <p>GMUs: west portion of 13A, 13B, &amp; 13D; 13E (except Cantwell and upper Nenana River); 14A &amp; 14B; 16A &amp; 16B (north half)</p>
<p><b>Soldotna (Kenai) Area Office (V)</b>  514 Funny River Road  Soldotna, AK 99669-8255  714-2478 phone  260-5992 fax  Ginny Litchfield, Area Office Manager  ginny.litchfield@alaska.gov</p>	<p>Kenai Peninsula - Kenai, Soldotna, Homer, Seldovia, Portage, Cooper Landing, Seward</p> <p>GMUs: 7; 15</p>
<p><b>Craig Area Office (VII)</b>  P.O. Box 668  Craig, AK 99921-0668  826-2560 phone  826-2562 fax  Mark Minnillo, Area Office Manager  mark.minnillo@alaska.gov</p>	<p>Southern Southeast - Prince of Wales, Dall, Long, Revillagigedo, and Gravina islands - Ketchikan, Craig, Klawock, Thorne Bay, Hyder, Hydaburg, , Coffman Cove</p> <p>GMU: 1A (most); 2</p>

# ATLAS AND CATALOG USERS' GUIDE

## FORMAT

The Atlas and Catalog are divided into six volumes corresponding to Alaska's six fish and game resource management regions (Arctic, Interior, Western, Southwestern, Southcentral, Southeastern) established in 1982 by the Joint Boards of Fisheries and Game (see Figure 1). A figure on the front cover of each Catalog and Atlas shows the geographic area covered in that volume.

The Catalog is a numerical listing of the water bodies documented as being used by anadromous fish. Also listed are the U.S. Geological Survey (USGS) quadrangle (quad) map, latitude, longitude, anadromous fish documented in the water body and a legal description for the mouth and upper known extent of anadromous fish use for each specified water body.

The Atlas to the Catalog is a compilation of topographic maps that cartographically shows the location, name, and number of these specified anadromous fish-bearing water bodies, the anadromous fish species using these water bodies, and the fish life history phases for which the water bodies are used (to the extent known).

## LIMITATIONS

Location information (latitude/longitudes, legal descriptions) and graphic representations used in the Atlas and Catalog are primarily derived from USGS quad maps, from field observations, and in some cases from aerial photos. ADF&G use the most recent editions of these quad maps, when possible, to depict as accurately as possible the locations of water bodies found in the Atlas and Catalog. The intent is to avoid any confusion when referring to a specific water body. In some parts of Alaska, however, channel and coastline configurations have changed since the relevant USGS quad map was published, making it not entirely accurate for on-the-ground use. Locations listed in the catalog should be compared to the water body locations depicted on Atlas maps, not to field-surveyed or photo-extracted locations.

In some instances, polygons are used to specify areas containing a number of water bodies supporting anadromous fish that are impossible to depict legibly and accurately on 1:63,360-scale maps. Generally used by juvenile anadromous fish for rearing, water bodies in these polygons are highly productive and are considered important for anadromous fishes.

Fisheries surveys are important tools protecting anadromous fish habitat, and for managing sport, personal use, subsistence and commercial fisheries. Data are collected by various methods including aircraft, boat, and foot. Due to timing, water clarity, temperature, survey method or other factors, a survey for a particular species may fail to gather complete life-phase information, or observe juvenile fish, non-targeted anadromous fish species, or the actual upper limit of anadromous fish use. Therefore, the upper points of stream reaches listed in the Catalog and shown in the Atlas usually reflect the extent of fish surveys or known anadromous fish use in a particular water body rather than the *actual* limits of anadromous fish occurrence or of habitat use.

In addition, only a limited number of the water bodies in Alaska have actually been surveyed. Virtually all-coastal water bodies in the state provide important habitat for anadromous fish, as do many unsurveyed tributaries to known anadromous fish-bearing water bodies. Anadromous fish often rear in small tributaries, flood channels, intermittent streams, and beaver ponds. Due to the remote location, small size, or ephemeral nature of these systems, most have not been surveyed and are not included in the Catalog or Atlas.

- 6
- 1 SOUTHEASTERN
  - 2 SOUTHCENTRAL
  - 3 SOUTHWESTERN
  - 4 WESTERN
  - 5 ARCTIC
  - 6 INTERIOR

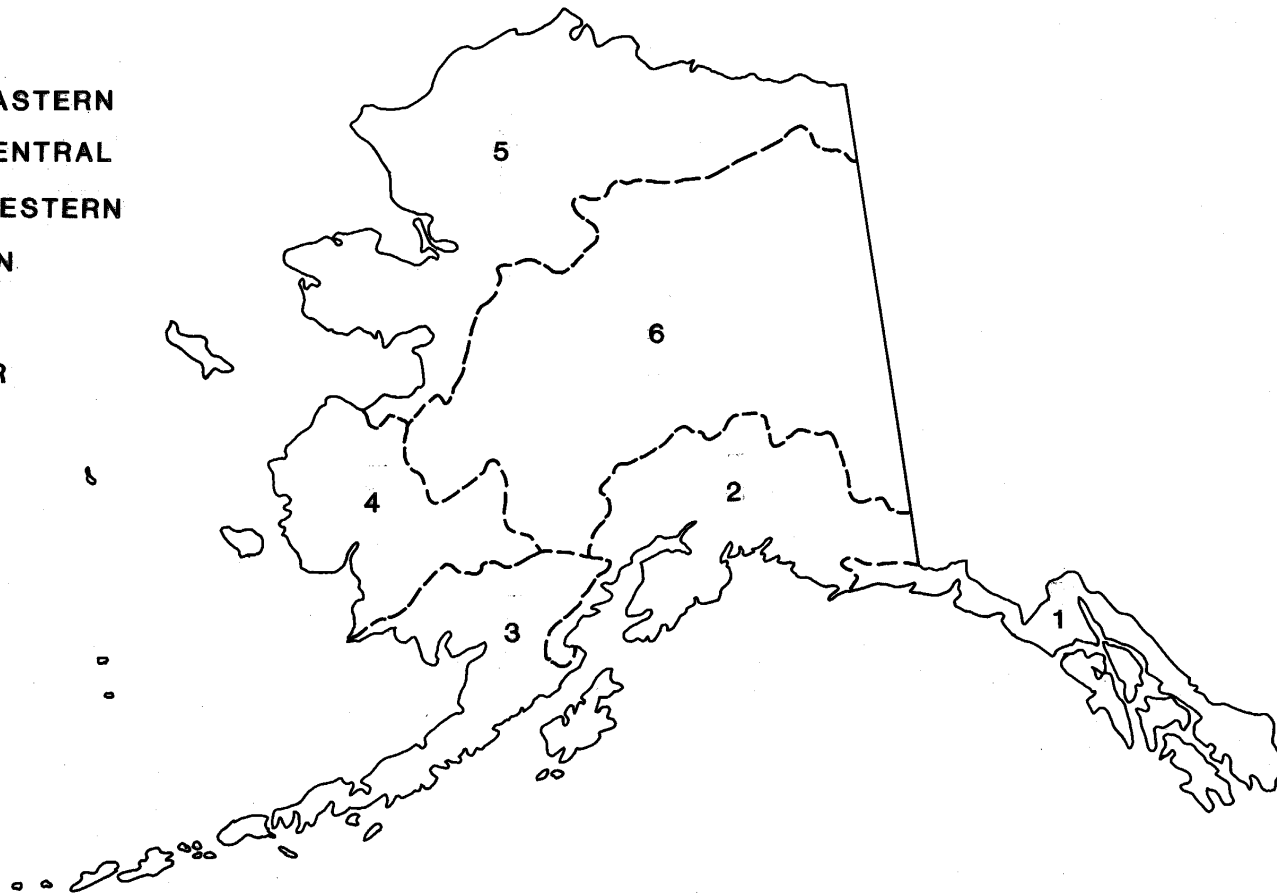


Figure 1.—Atlas and Catalog Regional Boundaries

## INTERPRETATION OF THE ATLAS

Alaska is depicted by 153 1:250,000-scale USGS quadrangles (see Figure 2). Most quadrangles of this scale are further divided into 1:63,360-scale inch-to-the-mile maps (*also* known as quadrangles). The Atlas contains the 1:250,000-scale quadrangles to help users locate anadromous water body information on the more detailed 1:63,360-scale map(s), if any exist for an area. Where inch-to-the-mile USGS maps do not yet exist (e.g., in parts of the Interior, Arctic, Western, and Southwest regions), specified water bodies are drawn at 1:63,360-scale (inch-to-the-mile) using the 1:250,000-scale quadrangles as the base maps.

### Numbering of Specified Water Bodies

Note: Examples given below refer to Figure 3.

All streams, rivers, and lakes specified in the Atlas and Catalog have a unique identifying number. The first six elements consist of a three-digit number and a two-digit number, separated by a hyphen. By convention, this number set is derived from the 1982 ADF&G statistical fishing district number which identifies the body of salt water to which the system drains. In order to maintain a unique number for each specified water body through time the numbering system in the Atlas and Catalog remains based on the original 1982 statistical area boundaries, although fish district numbers change periodically.

Rivers or streams which flow directly into salt water are identified by a five-digit suffix added to the fishing district number. For each main channel river or stream, this suffix begins with the number 1. For example, Big River (at the top of Figure 3) is “101-52-10100” (where “101-52” identifies the statistical fishing district and “10100” is a main channel water body in that district).

A stream branching from a main channel water body (tributary) carries the same base number (e.g., 101-52-10100) plus a four-digit number indicating that specific tributary. By convention, the last digit of a number sequence used to identify tributary streams will be even if the tributary branches to the right (heading upstream) and odd if it branches to the left. In the example, provided, “2021” denotes the tributary that branches to the left (heading upstream) on Big River, making the entire number for this tributary stream 101-52-10100-2021. Succeeding tributary streams are numbered in the same way by adding a four-digit number for each branch. The first digit for each branch sequence always indicates the progression of tributary stream numbering from the main channel.

Because of limited space on maps, often only the number sequence of a specific tributary appears next to that tributary; however, the entire number sequence down to the statistical fishing district number can be determined by following the water body downstream. The Catalog lists the entire water body number.

The number assigned to a lake begins with the number of the stream that drains from it, plus a four-digit number beginning with a zero. In Figure 3, a lake occurs along a tributary stream in the Blue Creek drainage. Therefore, the unique identification number first designates the tributary stream number (101-53-10100-2010-3005), followed by the four-digit lake identifier (0010), resulting in the full designation (101-53-10010-2010-3005-0010).



Figure 2.-1:250,000-scale quad names and numbers.

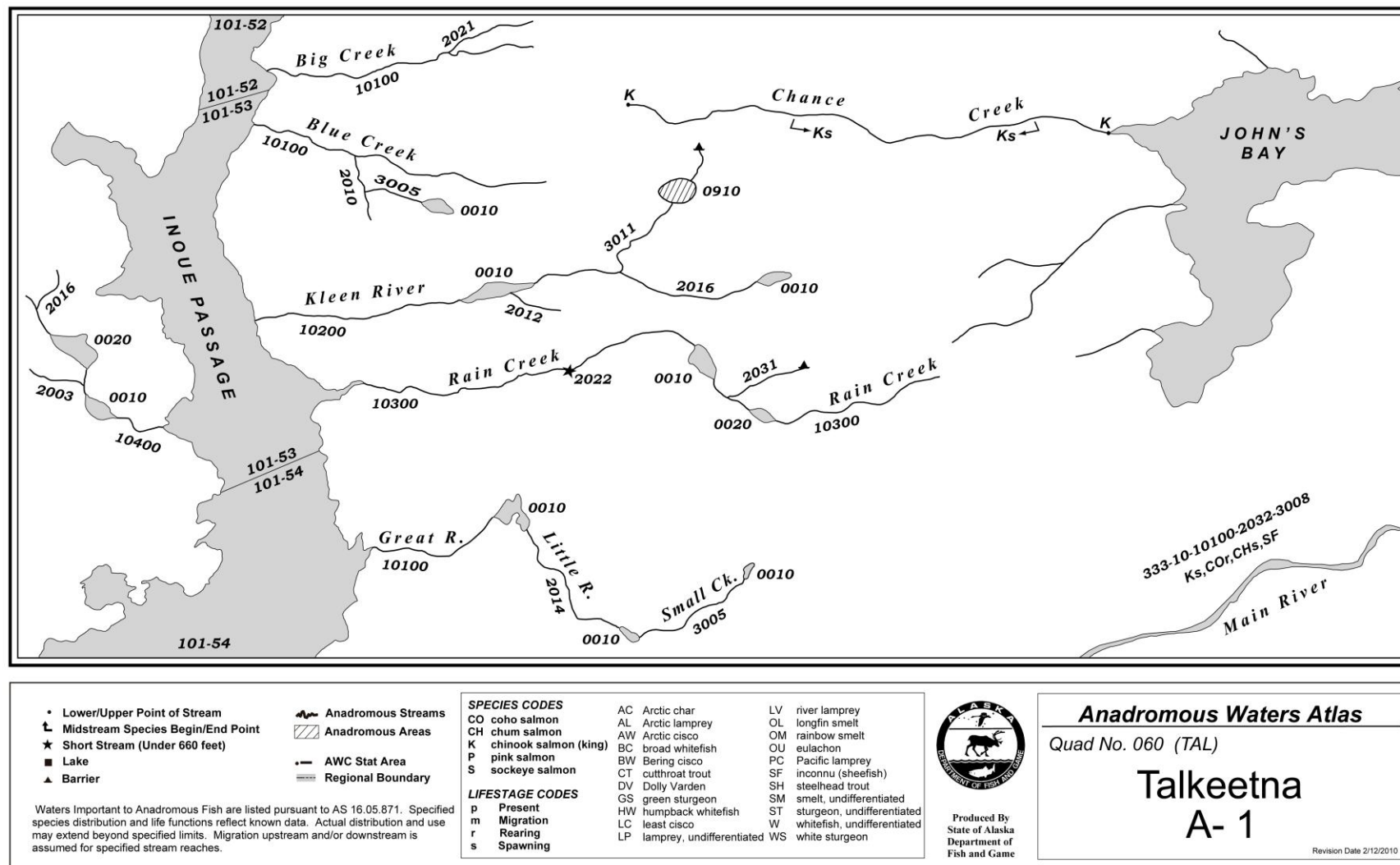


Figure 3.—Examples of Atlas stream numbering.

Used only in special cases, polygons will be numbered, whenever possible, with the stream number on which the polygon is located. This number is then followed by a four-digit number sequence beginning with 09 to designate the polygon. In the example, a polygon adjoins a tributary to the Kleen River. The polygon's unique identification number would be 101-53-10200-2016-3011-0910, the stream number (101-53-10200-2016-3011) plus the polygon designator "0910."

Figure 3 shows four watersheds having multiple lakes and flowing to Inoue Passage. Each illustrates a different aspect of the water body numbering system.

1. The main channel is named "Kleen River," but the named river does not continue above the first lake. Kleen River is numbered 101-53-10200, (101-53 for statistical fishing district "101-53" followed by the main channel river). A lake identifier "0010" is then added to denote the first lake upstream of Kleen River. All tributaries flowing into a lake retain the base number of the lake's outlet stream but add a *next*-higher-tributary stream identifier. The tributary to the first lake above Kleen River is therefore numbered 101-53-10200-2012. A headwater lake that drains into a tributary reflects that sequence in its last two suffixes: 101-53-10200-2016-0010 with -2016 identifying the tributary stream and -0010 designating the lake. Any streams flowing into this lake would be tributary streams and numbered accordingly.
2. A multi-lake example, Rain Creek passes through a series of lakes. Each lake is assigned the main channel number 101-53-10300, followed by a sequential and unique lake number, 0010 for the first lake, and 0020 for the second. Tributaries to either Rain Creek or the lakes (none shown) would bear a tributary stream number after the base number.
3. The same numbering conventions apply to a system with unnamed streams (see left side of Inoue Passage). Each lake is numbered from the main channel, with an added lake number (101-53-10400-0010, for the first lake, and 101-53-10400-0020 for the second lake).
4. In the final example, Great River, Little River, and Small Creek are tributary streams. Each named stream is separated by a lake, to which it is a tributary. The lake above each tributary has the same number as its outlet stream but with an added lake identifier. The first lake (above stream Great River) is 101-54-10100-0010; the second lake (above the next tributary named Little River) is 101-54-10100-2014-0010; and the third lake (above the next tributary named Small Creek) is 101-54-10100-2014-3005-0010. Alone, the lake identifiers for these three lakes appear to be the same; however, when combined with the outlet stream number, a unique number for each stream is formed.

## Symbols

The alphanumeric map number in the lower left corner of the maps identifies the 1:63,360-scale quadrangle of the 1:250,000-scale quadrangle (Numbers for the 1:250,000-scale quadrangles are identified on Figure 3). The legend beneath each map lists letter symbols for each fish species and life activity. Some maps also include the symbol (^) to depict streams for which the length of documented fish habitat is too short (less than 660 feet) to accurately map at the 1:63,360-scale. In most cases, barriers to fish passage or limits of fish survey efforts account for the short terminus. Locations where barriers are known to exist are denoted by the ( . ) symbol.

Arrows on the maps delineate the distribution of fish in a water body, where known. A single arrow drawn at the mouth of a stream or stream reach shows which fish species migrate upstream. Downstream-pointing arrows farther upstream indicate the highest point at which a fish species is currently known to occur (see symbols for king salmon spawning on Chance Creek, Figure 3).

The anadromous waters number and species string is used to indicate the range of anadromous fish species that continues onto adjacent Atlas maps.

## INTERPRETATION OF THE CATALOG

### Water Bodies by Number

Each water body in the *Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes* is listed on two lines. The first line contains the water body number, information about the location of the mouth of the water body, and the known anadromous fish species and life stages present at the mouth of water body. The second line lists the water body name (if known) and location information for the upper point, and the known anadromous fish species and life stages present at the upper point. Column headings occur at the top of each page. For example, Grant Creek would be listed as follows:

WATER BODY NUMBER / NAME	MAP SHEET	LAT. (NAD 83)	LONG. (NAD 83)	LEGAL	SPECIES
101-75-10100	Bradfield Canal A-4	56.03889 N	131.21270 W	C 67S 92E 29	Kp,COp,Ps,CHs,SHp
Grant Creek	Bradfield Canal A-5	56.10856 N	131.34453 W	C 66S 91E 33	Ks,COs,Ps,CHs

In this example, the first line lists:

1. the water body number (101-75-10100);
2. the USGS map quadrangle containing the mouth of the water body (Bradfield Canal A-4);
3. the latitude-longitude of the mouth of the water body in decimal degrees (56.03889 latitude North; 131.21270 West longitude, NAD 1983 datum);
4. the legal description of the water body mouth, given by meridian (*Copper River*), township (67 South), range (92 East), and section (29); and
5. the species string for the species and life stages present or entering at the mouth.

The second line lists:

1. the water body name, if known (Grant Creek);
2. the USGS map quadrangle containing the water body's upper point, if different from the quadrangle containing the mouth (Bradfield Canal A-5);
3. the latitude-longitude of the upper point in decimal degrees (NAD 1983 datum);
4. the legal description of the upper point; and
5. the species string for the species and life stages present or at the upper extent of the water body.

For purposes of data presentation in the catalog, lakes and polygons do not have mouths or upper points. Instead, the location information contained in the first line reflects a point near the middle of the lake or polygon on the cited quadrangle map. Applicable statutes and regulations still apply to the entire extent of all AWC listed water bodies that span one or more ITM quadrangles even if these water bodies are located on a quad or quads not listed in the AWC catalog for those water bodies. If

any portion of a lake occurs on several quadrangle maps, only one quad will appear in the first line. The lake or polygon name will appear on the second line if known.

### **Annotation Codes**

Species, life stage, and meridian codes as presented in the Atlas and Catalog are described below.

Table 2.–List of Annotation Codes.

<b><u>SPECIES CODES</u></b>	<b><u>LIFE STAGE CODES</u></b>	<b><u>MERIDIAN CODES</u></b>
AC = Arctic Char	m = migration	C = Copper River Meridian
AW = Arctic Cisco	p = present	F = Fairbanks Meridian
AL = Arctic Lamprey	r = rearing	K = Kateel River Meridian
BW = Bering Cisco	s = spawning	S = Seward Meridian
BC = Broad Whitefish		U = Umiat Meridian
K = Chinook Salmon		
CH = Chum Salmon		
CO = Coho Salmon		
CT = Cutthroat Trout		
DV = Dolly Varden		
OU = Eulachon		
GS = Green sturgeon		
HW = Humpback Whitefish		
SF = Inconnu/Sheefish		
LP = Lamprey, undifferentiated		
LC = Least Cisco		
OL = Longfin Smelt		
PC = Pacific Lamprey		
P = Pink Salmon		
OM = Rainbow Smelt		
LV = River Lamprey		
SM = Smelts, undifferentiated		
S = Sockeye Salmon		
SH = Steelhead Trout		
ST = Sturgeon, undifferentiated		
W = Whitefishes, undifferentiated		
WS = White sturgeon		

## **Water Bodies by Name**

To reference anadromous water bodies by name, use the alphabetical listing of known named water bodies in the second part of the catalog. Local names are denoted by an \* that appears in the front of the name and appears first in the alphabetical listing.

## **SOURCES**

Sources of information for the 1982 revision of the *Atlas and Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes* were the following:

ADF&G "Alaska's Fisheries Atlas" (1978);

ADF&G field notes from area and regional offices and various;

ADF&G individual reports;

U.S. Forest Service;

U.S. Fish and Wildlife Service;

Revised Anadromous Fish Stream Catalog of Southeastern Alaska (1977) by John Edgington, Robert Larson, Jim Eastwood and Paul Novak;

Bureau of Land Management survey notes; and

Index to North Slope Stream and Lake Surveys (1982) by Terry Bendock and John Burr.

Since the 1982 revision, the Atlas and Catalog have been revised periodically with information on anadromous water bodies being provided by various state and federal agencies, private companies, and individuals.

## **UPDATE PROCEDURES**

Procedures are in place that provide for regular updating of the Atlas and Catalog. Water bodies, or particular stream reaches, can be added or deleted and the upper range of anadromous water bodies changed as more current surveys document the presence or absence of anadromous fish. Anyone can submit a proposal for additions or changes to the Atlas and Catalog. However, proposals from other than ADF&G staff may be subject to field verification prior to approval by ADF&G.

Proposals for revisions to the Atlas and Catalog should be submitted to the Anchorage ADF&G, Division of Sport Fish. The proposed revision must include a nomination form, available through Division of Sport Fish regional offices, which lists the name and location of the water body, the fish species observed using the water body, the date fish were observed; the life stages (migration, spawning, or rearing) for which the water body is being used, if known; and any other clarifying information. The person submitting the proposed revision must sign the nomination form.

The location of the water body and the upper known extent of anadromous fish use should be marked on a 1:63,360-scale USGS map or better. Field sketches or aerial photography are also helpful.

It is anticipated that the Atlas and Catalog will be revised approximately every 12 months.

## **ACKNOWLEDGMENTS**

The production of the Anadromous Waters Regional Catalogs and companion Atlas maps was facilitated with the assistance of a number of personnel. Carol Barnhill, Frances Inoue, and Jason Graham were responsible for data entry of nomination information into regional geodatabases, which were used to create water body listings tables and Atlas maps. Ryan Snow, and Philip Repetto provided database-programming support used to create Catalog stream listings and Joanne MacClellan and Barbara Weiss aided with text formatting of the regional Catalogs. Updates to the Catalog and Atlas were made possible by ADF&G area and field office staff as well as federal, state, and local resource agency personnel, past and present that conducted the fieldwork necessary to generate nominations. Development and publication of this manuscript was financed by the Federal Aid in Sport Fish Restoration Act (16 U.S.C. 777-777K) under Grant No. AK F-10-27, Study Number H-09; produced jointly with Alaska Department of Fish and Game, Division of Habitat.

## DEFINITIONS

1. **“Area Office”** means the local area office of the Alaska Department of Fish and Game, Division of Habitat. (Refer to the Contacts section of the introduction for office locations)
2. **“Anadromous Fish”** means a fish or fish species that spends portions of its life cycle in both fresh and salt waters, entering fresh water from the sea to spawn and includes the anadromous forms of pacific trout and salmon of the genus *Oncorhynchus* (rainbow and cutthroat trout and chinook, coho, sockeye, chum and pink salmon), Arctic char, Dolly Varden, sheefish, smelts, lamprey, whitefish, and sturgeon.
3. **“Atlas”** means *An Atlas to the Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes*.
4. **“Backwaters”** means a portion of the water body formed by an eddy along channel margins downstream from obstructions such as bars, root wads, or boulders, or as the result of back-flooding upstream from an obstruction sometimes separated from the channel by sand or gravel bars.
5. **“Banks”** means the portion of the stream channel cross section that restricts the lateral movement of water at normal bank-full levels often exhibiting a distinct break in slope from the stream bottom.
6. **“Bed”** means the substrate, bounded by the stream banks, over or through which the water column flows.
7. **“Braided channels”** means the intertwined branches or secondary channels of a river or stream and characterized by the separation and rejoining of two or more channels separated by bars or islands.
8. **“Catalog”** means the *Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes*.
9. **“Distributary”** means a stream that flows away from, and does not rejoin, the main channel, and which usually flows to a sea, lake, stream, or other body of water.
10. **“Estuary”** means a semi-enclosed coastal body of water with a free connection to the sea and in which seawater is measurably diluted with freshwater derived from land drainage.
11. **“Fish”** means any species of aquatic finfish, invertebrate, or amphibian, in any stage of its life cycle, found in or introduced into the state, and includes any part of such aquatic finfish, invertebrate, or amphibian;
12. **“Fish Habitat”** means any area on which fish depend, directly or indirectly, during any stage of their life cycle, including but not limited to areas of spawning, rearing, food supply, overwintering, or migration.
13. **“Lake”** means an inland water body, permanent or seasonal, occupying a basin or hollow in the earth's surface, which may or may not have a current or single direction of flow.
14. **“Mean high water”** means a tidal datum used in referring to tidelands or the tidally affected portion of the stream, that is equal to the average of all high tides over a 19-year Metonic cycle, as established by the National Ocean Service of the National Oceanic and Atmospheric Administration.



15. **“Mean lower low water”** means a tidal datum used in referring to tidelands or the tidally affected portion of the stream, that is equal to the average of the lower of the two low tides of each day over a 19-year Metonic cycle, as established by the National Ocean Service of the National Oceanic and Atmospheric Administration.
16. **“Migration”** means the predictable, purposeful, or seasonal movement of fish, unrestricted by other than natural influences.
17. **“Mitigation”** means measures which must be undertaken by an applicant to avoid, minimize, rectify, reduce, or compensate for potential adverse impacts to fish or fish habitat resulting from a proposed use or activity
18. **“Mouth”** means a line drawn between the seaward extremities of the exposed tideland banks of any stream channel(s) at mean lower low water; a stream or river may have more than one mouth by virtue of having more than one channel that empties into a receiving body of water.
19. **“Permit”** means the written approval by the commissioner of ADF&G or the commissioner’s authorized representative, in the form of a Fish Habitat Permit issued through an area office of the ADF&G, Division of Habitat, based on plans and specifications as required by either AS 16.05.841 or AS 16.05.871.
20. **“Pollute”** means altering the physical, chemical or biological properties of a stream, river, or lake to the extent that the water fails to meet the Alaska Water Quality Standards for the “Growth and Propagation of Fish, Shellfish, Other Aquatic Life, and Wildlife” set forth in 18 AAC 70.010 - .990.
21. **“Polygon”** means a geographic area of numerous water bodies or wetland areas that cannot be accurately mapped at the 1:63,360-scale and which are important for the spawning rearing or migration of anadromous fish. These polygons are listed in the Catalog with single point identifiers and delineated on the Atlas maps by a dashed line boundary. All waters within these polygons are considered specified anadromous fish bearing water bodies.
22. **“Portion of the bed(s) and banks, up to the ordinary high water mark (OHW)”** means (A) in the non-tidal portion of a river, lake, or stream: the portion of the bed(s) and banks up to which the presence and action of the non-tidal water is so common and usual, and so long continued in all ordinary years, as to leave a natural line or "mark" impressed on the bank or shore as indicated by erosion, shelving, changes in soil characteristics, destruction of terrestrial vegetation, or other distinctive physical characteristics; (B) in a braided river, lake, or stream: the area delimited by the natural line or "mark," as defined in Part A above, impressed on the bank or shore of the outside margin of the most distant channels; or (C) in the tidally influenced portion of a river, lake, or stream: the portion of the bed(s) and banks below the (1) OHW as described in A or B above, or (2) mean high water elevation; whichever is higher at the project site.
23. **“Present”** means documented occurrence of anadromous fish in specified water body through direct observation or due to extrapolation downstream from observation and documentation of spawning or rearing anadromous fish in a specified water body or water bodies located upstream.
24. **“Rearing”** means the developmental life phase of a fish from fertilization of eggs to adult.
25. **“River”** means a stream of fairly large size flowing in a definite course or channel, or a series of diverging and converging channels.

26. **“Slough”** means (A) a low, swampy ground or overflow channels where water flows sluggishly for considerable distances; (B) a side channel slough formed by channelization; (C) a sluggish channel of water, such as a side channel of a stream, in which water flows slowly through low, swampy ground, or a section of an abandoned stream channel containing water most or all of the year, but with flow only at high water, and occurring in a flood plain or delta; (D) a marsh tract lying in a shallow, undrained depression on a piece of dry ground; (E) term used for a creek or sluggish body of water in a bottomland.
27. **“Spawning”** means the deposition or fertilization of fish eggs, including preparation for deposition or fertilization.
28. **“Specified upper limit”** means the documented upstream limit of anadromous fish use as depicted in *An Atlas to the Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes* or listed in the *Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes*.
29. **“Specified Water Body”** means a river, stream, or lake, in its liquid or frozen state, its braided channels, distributaries, sloughs, backwaters, and estuaries, including the portion of the bed(s) and banks up to the ordinary high water mark, from its mouth to its specified upper limit as depicted in *An Atlas to the Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes* or listed in the *Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes*.
30. **“Stream”** means a natural or artificial watercourse containing flowing water at least part of the year including a river, creek or tributary.

## **STREAM LISTING BY NUMBER**

## **STREAM LISTING BY NAME**